THE WAVY-STRIPED FLEA-BEETLE.

BY HENRY SHIMER, M. D.

THIS beautiful little beetle, also called "Striped Turnip-fly" (*Haltica striolata* Fabricius) at the West, is well known and abundant. Every gardener is conversant with the fact that like fleas, grasshoppers, etc., it springs away to a great distance when he attempts to put his finger upon it. It appears in early spring, and is a constant annoyance to the gardener during the whole summer.

The Striped Turnip-beetle (Fig. 1) is less than one-tenth of an inch in length. Its general appearance is black, with a broad wavy yellowish, or buff-colored stripe, on each wing-cover. The larva (Fig. 2; 2 *a*, pupa) is white, with a faint darkened or dusky median line on the anterior half of the body, being probably the contents of the alimentary canal seen through the semitranslucent skin. The head is horny and light brown. On the posterior extremity is a brown spot equal to the head in size; and there are six true legs and one proleg. In its form and general appearance it somewhat resembles the larva of the Cucumber-beetle, but it is much smaller. Its motion is slow, arching up the abdomen slightly, on paper or any smooth surface, in such a position that its motions are necessarily awkward and unnatural, because in a state of nature it never crawls over the surface, but digs and burrows among the roots in the ground. Its length is .35 of an inch, and breadth .06 of an inch. It feeds upon roots beneath the ground.

Fig. 1. Fig. 2. 2*a*.

The pupa is naked, white, and transforms in a little earthen cocoon, pressed and prepared by the larva, in the ground near its feeding place. This period is short.

From my notes I see that on June 14, 1865, I put a

number of the larvæ into a breeding-box with a supply of their natural food. June 17th, some of the larvæ had disappeared beneath the ground. July 4th, I found in the box the beetle. This gives us seventeen days from the time the larva entered the ground, having ceased eating, until I obtained the perfect insect. I did not open the breeding-box every day, but as the insect was yet quite pale and soft, conclude that it was not more than a day or so out of the ground. The actual time, however, in the pupa state, was less than seventeen days, for, like the larva of the Cucumber-beetle and other beetles, these worms pass a kind of intermediate state, in a quiet, motionless condition, in their little dirt-tombs beneath the ground. During this time they decrease in length very much, becoming a shorter, thicker "grub." This period is a peculiar part of the larval state, and may be called the quiescent, or "shortening period," in contrast with the feeding period. At the end of this preparatory, shortening period, the little larva casts its skin and becomes a pupa.

During the past summer I bred a good number of these beetles from the larva and pupa, taken from their breeding places beneath the ground; but as I took no precise notes of the date, I can say no more regarding the time of the pupa state, except that it is short, only a few days.

Every gardener knows that these insects are very injurious to young cabbages and turnips as soon as they appear above the ground, by eating off the seed-leaves; he also almost universally imagines that when the second, or true plant-leaves appear, then the young plant is safe from their depredations, then the stem is so hard that the insect will not bite it, and the leaves grow out so rapidly as not usually to be injured by them; but if we would gain much true knowledge of what is going on around us, even among these most simple and common things, we must learn to observe more closely than most men do.

The gardener sees his young cabbage plants growing well

for a time, but at length they become pale or sickly, wither and die in some dry period that usually occurs about that time, and attributes their death to the dry weather; but if he will take the pains to examine the roots of the plants, he will find them eaten away by some insect, and by searching closely about the roots will find the larva, grub, worm, or whatever else he may choose to call it; from this he can breed the Striped Turnip-beetle, as I have often done.

I have observed the depredations of these larvæ for ten years, and most of that time had a convincing knowledge of their origin, but only proved it in 1865; since that time I have made yearly verifications of this fact.

Every year the young cabbage plants and turnips in this region receive great damage from these larvæ, and often when we have dry weather, in the latter part of May and early in June, the cabbage plants are ruined. A large proportion of the plants are killed outright in June, and the balance rendered scarcely fit for planting, but when the ground is wet to the *surface* all the time by frequent rains, the young plant is able to defend itself much more effectually, by throwing out roots at the surface of the ground, when the main or centre root is devoured by the larva; but in dry weather these surface roots find no nourishment and the plant must perish.

This year I saw these beetles most numerous in early spring, but have often seen them in August and September, so abundant on cabbages, that the leaves were eaten full of holes, and all speckled from their presence, hundreds often being on a leaf, and at this time the entire turnip crop is sometimes destroyed by them, and seldom a year passes without their doing great injury.

These observations are not entirely in accordance with the teachings of the masters in entomology. From Westwood's Introduction we learn that the Chrysomelians feed on the leaves of plants; that some of them attach themselves to the leaves to transform, and that others descend into the ground

for this purpose, but has no notes of species feeding beneath the ground. Harris was of the opinion that the Striped Cucumber-beetles, in the larval state, fed on the roots of plants, but was never able to find them. I have demonstrated, many years ago, that they feed on the roots of melon, cucumber, squash, and pumpkin vines, and ever since I attempted to raise any kind of vine, my greatest trouble has been *not to find them.*

The Chrysomelians, probably, as a rule, feed on the leaves of plants in the larval state, but in my limited researches I have found the majority of them beneath the ground. According to undisputed authority, they often congregate together in great numbers, and do great injury to the leaves of plants, even so as to compare with the ravages of caterpilars. I myself have observed some of this work.

As the Cucumber-beetle exclusively raises its young on the roots of the Cucurbitaceous (gourd) family, so from these observations I am led to believe from analogy, that the Striped Turnip-beetle raises its young always on the roots of the Cruciferous (mustard) family.

FERNS.*

BY JOHN L. RUSSELL.

THE revelations of the science of geology have made it evident that in the early periods of the earth's history, especially in the formation of the coal beds, the ferns and their immediate allies formed no inconspicuous feature in the vegetation, and that the diminished and dwarfed forms of the present day represent the arborescent ones of that time. But what the present flora may have lost in majesty of size, it has gained in greater variety, and of the elegant and graceful

*A Fern Book for Everybody, containing all the British Ferns, with the foreign species suitable for a Fernery. By M. C. Cooke. Small 8vo, pp. 124. London, 1867.